Post-Conflict Factors and Repayment Rate of Microfinance Institutions in a Post-Conflict Economy: An Information Asymmetry and Enforcement Analysis

Case of Burundi

Tigist Woldetsadik Sommeno

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Tigist Woldetsadik Sommeno

http://www.duo.uio.no/

Trykk: Reprosentralen, Universitetet i Oslo

Dedicated to

My father, Ato Woldetsadik Sommeno

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Abstract

Based on interviews of MFIs in post war - Burundi about factors affecting their 2011 client loan defaults, this paper analyses how these factors contribute to a lower repayment rate using information asymmetry and an enforcement model. The primary repayment rate challenges found include confusing a loan with a grant, client mobility/migration, population displacement along with the creation of varieties of population features, households asset/wealth/ losses and genuine small business risk&/market losses/.

The increase in in the number of risky borrowers as a result of a rise in the misunderstanding of a loan due to long-term relief intervention can lead to a high-risk, low- repayment rate equilibrium under adverse selection scenarios. Furthermore, the resulting loss of willingness to repay the loan makes enforcement difficult. The decrease in the incentive power of future loans due to client migration, a lower social stigma resulting from the creation of various population features in the community along with population displacement, and a lower implicit group collateral possibility as a result of household asset/wealth losses weaken peer pressure, monitoring and enforcement mechanisms, thereby reducing the loan repayment rate.

Understanding the interrelationship of these factors is crucial for MFIs in a post-war setting for designing viable outreach strategies that sustainably addresses the financial needs of a post-war society.

Contents

Figure 3. 1 Reasons for the loan default with the associated frequency.....8

Figure 4 A: The expected profit from lending as a function of return for $1.00 lent Eπ(r).....27

Table A, B , C and D: Pay-off matrix for group lending with and without group social penalty and the pay-off representation of individual lending.....44

List of abbreviations

PW	post-war
MFIs	Microfinance institutions
RIM	Réseau des Institutions de Microfinance au Burundi
USAID	United States Agency for International Development
FLN	Forces for National Liberation, also called NLF or FROLINA
CECEM	Caisse Coopérative d'Epargne et de Crédit Mutuel
FSTS	Fonds de Solidarité des Travailleurs de la Santé
FSTJ	Fonds de Solidarité des Cadres Judiciaires
FSTE	Fonds de Solidarité des Travailleurs de l'Enseignement
FENACOBU	Fédération Nationale des COOPECS du Burundi
SACCOs	Saving and credit cooperatives
NGOs	Non-Governmental organizations
IDP	Internally displaced People

1 Introduction

While finance is important for post-war (PW) economic reconstruction, the features unique in such an economy can be detrimental for sustainable intervention for a particular area. Microfinance intervention (MFI) has potential, but the intervention of microcredit has been debatable because of the risks associated with undertaking it. The unique potential of microfinance to reduce poverty and sustain itself can easily be lost if MFIs are not committed to ensuring sustainable outreach to the targeted clients through strict loan collection effort.

Loan repayment risks as a result of factors related to such post-war situations as population mobility, clients confusing micro-credit with a grant, the displacement of populations from their original homes and the creation of various population features, household asset/wealth losses, and high business and market risks necessitate that MFIs address these issues for the intervention to be reliable and effective.

In a world with perfect and complete market where there is no information asymmetry and enforcement problems the credit risk due to the these post-conflict factors can easily be controlled. However the market is far more imperfect and possible more in the post conflict scenario. The information asymmetry concerning the intent characteristics of borrowers (adverse selection), the monitoring of the actions of borrowers after they are given the loan (moral hazard), and the enforcement problems are more challenging in the presence of these post-conflict factors.

Population mobility makes enforcement difficult as well as impacting the efforts of the client after taking the loan. In addition, Misconception of loan with a grant creates risky characteristic for loan in the population worsening the adverse selection problem. On the other hand client misconception can also affect loan enforcement. And although clients may invest the funds properly and no adverse selection associated with misconception; their willingness to repay the loan can still be affected by their misunderstanding the concept of a microloan. The household wealth /assets/ losses inhibit the possibility of monitoring and enforcing the loan contract through physical collateral or a societal implicit collateral system. The population displacement and the post-conflict population characteristics can reduce the social stigma, thereby reducing the benefit of using social sanctions for loan enforcement and monitoring. The business risks that are intensified due to the lower purchasing power of the general public and the insecurity/theft in the market exposes small business operators to genuine risks, resulting in loan default.

The microfinance sector in Burundi is facing these post-war challenges as it attempts to finance economic activity and rebuild the society. "According to RIM (Réseau des Institutions de Microfinance au Burundi**)** (2010), the financial results of many of Burundian MFIs in 2007–09 were not good. Many MFIs took losses, while few managed to make profits, and the return to assets reached 30% for some MFIs. In general, Burundian MFIs appear to be very diverse in their financial results" (Moi¨se Sagamba 2012 et al.). In addition, the country has faced the negative experience of two fly-by-night MFIs which took the people's savings and then closed before the National Bank of Burundi instituted a more stringent registration and licensing process for MFIs. (USAID, 2008).

In spite of the high risks and costs faced by the microfinance institutions in such post-conflict areas, no scientific research has been conducted on understanding how post-war factors affect loan repayment rates of MFIs, with most of the literature focusing on case studies, donor briefs and practitioner reports on the challenges of operating in the PW environment. The study reported here take the step to provide scientific economic knowledge through exploring the post-conflict factors that determines loan repayment rate in Burundi and provide theoretical economic explanation about their consequence on loan repayment rate. Using the information collected through interviewing MFIs in post-war Burundi, this study explores what and how post-war factors determine the loan repayment rates of MFIs in relation to information asymmetry and enforcement problem.

The data collection involved all 21 MFIs operating in the year 2011, focusing on finding information on the primary reasons for their loan defaults in that year and the post-war related factors affecting their loan repayments. Moreover to get the general characteristic of the MFIs and undertake comparison between MFIs attribute and the stated reasons for clients loan defaults, I interviewed the MFIs on the characteristic[1] of MFIs and reviewed secondary information such as MFIs manuals and reports. However, most of the interview response on the general characteristic of MFIs was mostly unsuccessful and since I could not get enough reply on it from the MFIs.

The rest of this thesis is organized into the following three sections. The next section, Section Two, provides an overview of Burundi and its MFIs. Section Three presents the general information obtained from the MFI interviews. The section elaborates loan repayment challenges /source of client defaults as identified by the MFIs, the frequency for each reason based on the

[1] Number of product types, loan product characteristic , MFI type, breadth and depth of outreach, operational area, and age of MFI

number of time it was mentioned, and an overall description based on how MFIs explained each reason along with a general economic explanation of how the factors affect loan repayment. Finally, Section Four I analyses with economic theory, how the post-war can be detrimental for loan repayment rate by building up information asymmetry and enforcement model.

2 Burundi and microfinance

2.1 General overview of Burundi

Burundi, a land-locked country located in the Great Lakes Region of Eastern Africa, has a population of 10,557,259 composed of two major ethnic groups, the Hutus and the Tutsis, representing 85% and 14% of the total population, respectively, according to the July 2011 World Fact Book.

Since its independence in 1962, the country has experienced two genocides as defined by the final report of the International Commission of Inquiry for Burundi presented to the United Nations Security Council in 2002, the 1972 mass killings of the Hutus by the Tutsi-dominated army and the 1993 mass killings of the Tutsis by the Hutu populace. This ethnic violence, which lasted for decades, led to the torture and the killing of thousands of people. While many attempts at a peace agreement were made through the intervention of various international actors, the last cease-fire between Burundi President Nkurunziza and the leader, the remaining opposition group FNL (Forces for National Liberation, also called NLF or FROLINA) was not signed until May 26, 2008, through the mediation of South Africa's Minister for Safety and Security.

The country is now experiencing a post-conflict economy as it recovers from the long civil war. According to the country's 2012 strategy report, its economy is not adequately diversified, and remains highly vulnerable to external shocks (small landlocked country), political instability, as well as climate change. Small agriculture holdings are the mainstay of the economy, accounting for 43% of the GDP and 90% of the workforce. Although various developmental interventions and financial sectors such as banks and MFIs have expanded to support the revitalization of the country, their performance is still affected by the political and the economic instability in the country.

2.1 Overview of Microfinance in Burundi

The microfinance institutions in Burundi were opened at different times where most of them proliferated after the long civil war in the country. The five institutions opened before the war is CECEM, FSTS, FSTJ, FSTE, and FENACOBU, all being saving and credit cooperatives. Currently the country has 25 MFIs, 5 of which operate outside of Bujumbura and the remaining 20 in the capital. The five outside of the capital work primarily in their specific regions and in towns around their region, except for one which operates in Bujumbura as well.

There are mainly two forms of MFIs, Saving and credit cooperatives (SACCOs) and public limited companies. The SACCOs usually relay on financing various public employees through salary loan. The main source of funds for most institutions, especially for the SACCOs, is the savings of the clients. Bank loans and donor funds are also used by most institutions as funding sources.

According to 2011 data from RIM **(**Réseau des Institutions de Microfinance au Burundi**),** the total number of customers, the amount of loans granted and the average loan disbursed by the MFIs in Burundi were half a million, 63 million, and 4 million, respectively. The primary economic sectors or activities financed by the microfinance institutions include agriculture, commerce, craft, social entities and housing, with business/commerce/ finance receiving the largest share, 36%, followed by housing and agriculture at 26% and 24%, respectively.

Most of the MFIs mainly provide saving and credit products, except for one institution that reports remittance as an additional financial product. Usually, the loan products are distributed to groups backed by a group guarantee system or individually with a property or salary guarantee. To encourage loan enforcement, most MFIs use the Grameen Bank dynamic incentive strategy. The size of loan disbursed to clients' increases every time it is paid off. The interest rates charged by the MFIs are a flat monthly or yearly rate depending on the loan products the institutions offer. The annual interest rate ranges from 10 % to 18%, while the monthly interest rate charge of most institutions is between 2% to 3%, except for one MFI which charges up to 8% per month for overdraft loans which have to be paid in a month's time.

The repayment rate of MFIs for the year 2011 ranged from 66.9% to 99.4%, with most institutions indicating that the loan repayment risks emanating from the post-war factors were

less pervasive that year, evidence that the country was recovering. However, these institutions reported that they had encountered huge loan losses in the past as a result of factors related to operating in a post-war scenario, factors that remain reasons for loan failures.

3 Responses from the MFIs

To understand the post-conflict factors affecting the loan repayment rate of the MFIs in Burundi, managers of 21 institutions in operation in 2011 were interviewed concerning the reasons for their client loan defaults that year. That date was used in order to ensure this research was based on the most recent, consistent information available. The primary questions focused on the reasons for the defaults and the post-war related factors affecting their loan repayments. Since these two questions are very similar, the replies were also. However the main difference was that the first question centered on the general challenges/ reasons for loan repayment problems whereas the second focused specifically on factors related to the post-war situation of the country and loan repayment problems. The similarity in the answers to the two questions appears to imply that post-war related factors may be the most significant problem among the MFIs.

The responses received were classified into the following five reasons:

1- Misconception of micro-loan products as grants

2- High potential population mobility/migration

3- Household loss of assets due to the long civil war.

4- The creation of various population features in the community

5- High client business risks/market losses

To determine the association, if any, between the reasons mentioned and the MFIs themselves, the interview also asked for information on such characteristics as number of product types, loan product attributes interest rates, MFI type, breadth and depth of outreach, operational areas, and years in business. The difficulty in obtaining complete information and the diversity in most of these characteristics made it difficult to draw conclusions relating to the general feature of MFIs and their reasons.

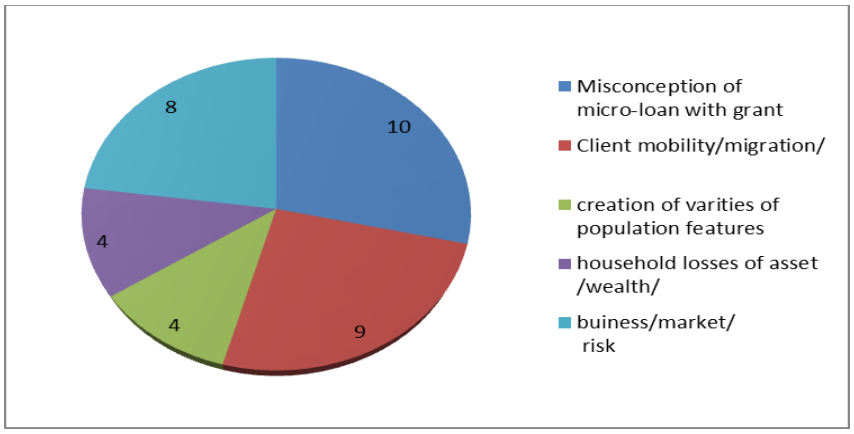
However, generally, the confusion between a loan and a grant appears to be highly prevalent in rural areas; this misconception was the primary reason given by all the institutions outside of Bujumbura. On the other hand, client migration and business risk were mentioned the most by MFIs operating in the capital city.

The section below more specifically analyses the number of MFIs mentioning each reason, including providing a general description of each and their relationship to client loan defaults.

3.1 Frequency measured as the total number of MFIs stating each reason

The frequency figure below shows the number of times each reason was mentioned by the 21 MFIs interviewed. As it illustrates, misconception of a micro-loan as a grant, client mobility/migration, business risk, creation of various population features, and client asset losses were mentioned by 48%, 43%, 38%, 19% and 19% of the MFIs, respectively. The first three problems seem to be most frequently mentioned by most institutions.

Figure 3. 1 Reasons for the loan default with the associated frequency



Source: Interviews with the managers of 21MFIs in Burundi

A detailed explanation of each reason is presented in Section 3.2 below.

3.2 Description of main reasons for loan default

3.2.1 Misconception of micro-loan product as a grant

As a result of the long civil war in Burundi, people have received various relief and development grants. Recently, some programs have been restructured as other forms of development assistance while some still function as grants. The previous culture of receiving grants has led to the misperception of the micro-loan products provided by the MFIs. In addition, some of the grant intervention is provided by the mother NGOs of the MFIs, and even some of the MFIs themselves have similar names, further complicating the confusion between loans and grants.

The guarantee fund strategy that MFI uses in collaboration with relief and development organizations also adds to the clients' misconceptions. As will be illustrated in Reason 3.2.4 below, one of the areas that makes a post-war economy different from a normal one is the various population features created as a result of the conflict--refuges, returnees, internally displaced populations, ex-soldiers/demobilized soldiers, and inhabitants. These different population sections have their own unique risks that lead to loan repayment risks. The guarantee fund is one of the strategies extended by some NGOs to the MFIs for incentivizing them to expand their financial efforts to include various risky segments such as refugees and demobilized soldiers. However, when clients see the collaboration between the MFI and the NGO that used to assist them with grants, they wrongly misconceive the loan as a donation and, thus, default on it.

The creation of clients' misconception of a loan can result in default through several ways. When clients misunderstand a loan, they may not invest in a venture that enables them to repay it. Clients may be more irresponsible with their investment when they think it is aid rather than money that they need to repay. On the other hand, clients might invest it safely, but due to their misperception, they do not pay back the money even if they can. Thus, misconception of the loan as a grant can result in adverse selection and enforcement problems, leading to default.

3.2.2 Population mobility /migration

High population mobility is a feature unique to the post-war environment. People flee their countries or areas, searching for better economic and political situations. This migration can create challenges for micro-credit intervention because it increases the risk of default. After receiving a loan, clients may move out of the country and fail to repay it. As mentioned in Section 3.1, client mobility is one of the frequent reasons for clients default as evidenced by the 9 MFIs citing it. Most other MFIs stated it as a prevalent problem in the past even though they hadn't encountered it in 2011.

Five of the nine MFIs that indicated client mobility as a reason for default are SACCOs that primarily use the salary guarantee system as collateral for a loan. In this system, clients supply a written agreement from their employers to directly transfer payment to the MFI account from their salary. This reduces involuntary and voluntary defaults by making the employer responsible for the payment of the loan. However, even this salary loan system is not far from the effect of clients' migration on loan repayment failure. In cases where clients leave their jobs and move out of the country without any notice to their employer, their salary automatically ceases as do the loan payments, meaning that the amount still owed defaults. However, with the salary guarantee system, 2 MFIs mentioned receiving repayments on loans that they had written off in previous periods. Through employer tracking and records, when the clients returned to the country, they were able to enforce the loan agreement. Although client migration is a challenge even to the MFIs using the salary guarantee system, collaboration with the employers helped in collecting the loans in cases where clients returned to the country. However, this system is available for only certain segments of the society, so its use and benefit are not widely applicable.

One of the ways for addressing the effect of migration on loan default is through the MFIs' dynamic incentive instrument that is used to curtail moral hazard and enforcement problems. The MFIs provide dynamic incentive contracts by offering repeat loans only for borrowers who repay them. This mechanism encourages repayment even in situations where there is a weak legal enforcement mechanism and high information barriers monitoring the actions of borrowers after receiving the loan. In addition, for MFIs that focus on small loan provisions based on collateral that is not easily enforceable, the main deterrent to default is the threat that no future loans will be forthcoming. However, the effectiveness of this dynamic incentive is

challenged in situations with a high potential for client mobility. After all moving out of reach or leaving the country, the client's incentive to repay the loan is low.

In the post-conflict setting of Burundi, implementing the dynamic incentive mechanisms through repeated lending is not possible for some MFIs. As a result, the enforcement constraint weakens; the high migration possibility reduces the opportunity cost from defaulting, thereby reducing the clients' incentive to repay the loan. This result is similar to the one mentioned by ESCWA/ECRI/2009/Technical Paper 4 on Microfinance ESCWA Conflict Region: "the goal of loan recovery is hard to achieve with a mobile population who may at any time abandon their loan. This is always the case in environment following conflict. Conflict could result in migration and population mobility."

3.2.3 Household loss of assets due to the long civil war.

Communities after a series of conflicts are not similar to those living in peace even if the income inflow is similar. A conflict-ridden community has been exposed to significant losses of physical and social capital, making undertaking micro-credit risky. The war in Burundi led to substantial destruction of assets, losses making it difficult for the people to find collateral for borrowing. This adds up on limited liability constraints, making loan repayment difficult in cases where clients face bankruptcy of their businesses. Even with the group loan, group members need implicit collateral in order to enforce loan repayment and put peer pressure on one another. However, substantial destruction of the assets of a community makes it problematic for the group member to pledge implicit collateral.

As seen in Section 3.1, of the 21 MFIs interviewed, 3 indicated this situation is a problem. The clients' poverty/loss of assets can affect loan repayment by worsening the moral hazard and enforcement problem. When MFIs have information barriers on how to monitor the clients' action or the legal mechanism for enforcing the contract is weak, group peer pressure and enforcement are the means the institutions use to address the moral hazard and enforcement problem. But when people have very little asset to seize among each other's, group monitoring and loan enforcement power is reduced, increasing the risk of loan default.

3.2.4 The creation of various population features in the community and population displacement.

People are displaced from their homes during a war, altering the current settlement of the population. As a result, people living in the same area could be inhabitants, internally displaced people, returnees, demobilized soldiers, and/or refugees from neighbouring countries, a diverse population requiring time to build social relationships. This situation again reduces the traditional MFI group lending social enforcement power. Although most MFIs mentioned their success in group lending, some stated that this system is challenging in a post-conflict environment. The creation of various population features brings differences in socio-economic backgrounds and in the way the communities cooperate and a lack of knowledge about one another, all of which affect the extent to which group loan peer monitoring and enforcement are possible.

The economic explanation for the effect on lower repayment rate is based on the dominance of strategic behaviour rather than social concerns in group lending. According to Xavier (2006), strategic behaviour and social concerns interact to yield effective contracts that can work both for customers and lenders. With people being less socially integrated, it is unlikely that the social factors override strategic behaviour for yielding incentive compatible contracts that ensure repayment.

The creation of various risky population features are mentioned as an important post-conflict factor creating credit risks beyond the impact caused by issues concerning their integration into the society or their lower social stigma. Each of the population features mentioned here is prone to the risks mentioned previously, making financing them challenging. In the interview, the MFIs were asked about the number of each population feature they finance, and their experience of financing each. While the number of each population features being financed was not available, some MFIs elaborated on their experiences of financing the different population segments, with the misconception of loan as a grant, high mobility/migration potential, asset losses and lower social stigma being mentioned as being significantly higher among internally displaced populations, returnees, and demobilized soldiers than inhabitants, precisely because of their characteristics.

Refugees--These are considered by most institutions as highly mobile, compounded by the difficulty in knowing when will return to their country. In addition, they have little collateral, and most of what they have is in their home country, meaning they have little to guarantee a

loan. Their lack of enough financial knowledge about the micro-loan product is another challenge. Because of the high relief intervention addressing the situations of refugees, their conception of micro-loan is mixed with a grant, making it risky to jump-start micro-loan provisions to this sector of society until they are educated about financial products and their responsibilities.

For these reason, some MFIs take away their target from refugees using implicit loan screenings. Two MFIs indicated they finance refugees but require more collateral, and 1 stated the unsatisfactory loan repayment reputation of refugees. Of the 8 who commented on the issues of financing refugees, only 3 finance them but require more collateral than usual because of the high risk, while the remaining 5 do not finance them because of the high risks involved.

While refugees need financial support in order to engage in economic activities that enable them to provide for their own needs, the financial risks associated with them need to be weighed carefully for microcredit intervention to be practical. Their high mobility, lack of suitable collateral, and high misconception of loan as a grant are the important risks that expose MFIs to a reduced chance of getting their loan back. MFIs should adopt a strategy addressing these risks in their micro-credit intervention with this segment of society.

Internally displaced people (IDP) —This population includes those who have left their homes, including all their constituents and located in another part of the country in search of safety and security. Internally displaced people (IDP) share some characteristics with refugees as they are displaced from their original living place for an undetermined length of time. Like refugees, they have also left their assets and are less integrated in the social and economic life of the new location, increasing the risk of financing this group. Two MFIs addressed their experiences of financing internally displaced people, both highlighting the risks of advancing loans to this segment. From the reply of the MFIs the participation of IDP in economic activity and develop financial demand is a necessary condition for micro-credit provision. However, with IDPs priority of satisfying their settlement issues and all the accompanying basic needs, extending micro-credit to IDP become a risky venture.

Demobilized soldiers--These are ex-soldiers, either on the rebel or the government side. Some MFIs classify demobilized soldiers who were part of the rebel army and the government army because of the difference in their characteristics and, hence, their risks for

financing. Finance is an important means for enabling ex-soldiers to become part of a business or self-employed, but it is not the complete solution. Because of the influence of the army and/or war, soldiers may have developed undesirable and risky character habits that need to be addressed before it is safe to introduce micro-loan products to this segment of the population.

Some institutions explain that ex-soldiers lack a viable borrower character by the very fact that they have developed habits which can make them risky to finance. Without a substantial change in character, the intervention of a micro-loan provision may prove meaningless. According to some MFIs, some ex-soldiers consider the micro-loan as their entitlement, and they lack the willingness to repay or to invest the loan in the venture that enables them to repay the loan.

Of the 7 MFIs that mentioned their finance experience with demobilized soldiers, 3 indicated that they have had a good experience and 4 mentioned a poor reputation as a critical problem in not getting their money back. Most of the good experiences with demobilized soldiers came from those who finance the ex-combatants from the government army with a guarantee of their pension from the Ministry of Defense.

Returnees—these are former refugees or IDP who have returned to their original homes or settled permanently in a new area in the country. Of the 3 MFIs that discussed their financial interventions with returnees, 2 reported bad experiences and 1 a successful experience. The main challenge that was mentioned in financing returnees was the free aid mentality that they develop as a result of the relief/grant assistance provided during their migration/displacement periods. Without the returnees adequately internalizing the micro-credit concept, the loan portfolio is susceptible to substantial risks.

3.2.5 High client business risks/ market losses

Business risk is one reason for client loan defaults. In its post-conflict economy, Burundi is experiencing high unemployment and low purchasing power of the general public, producing significant market problems for small business.

According to the United Nations Policy for Post-conflict Employment Creation, Income Generation and Reintegration Report of 2009, conflict is detrimental for growth, and employment creation by destroying infrastructure, stalling private investment, distracting the

input and output markets, damaging social fabric, destroying jobs and driving down wages. In addition, conflict exacerbates urban and rural unemployment. These also lead to a significant decrease in income and purchasing power of the general public.

From the replies of the MFIs, the effect of the long civil war in Burundi was no different. Clients with good business prospects were reported to have faced the risk of bankruptcy due to the lack of sufficient market in the country. In addition, security problems/thefts of small businesses operating in the market were other reasons for small business failures and, thus, client loan defaults.

As Section 2.1 indicated, in 2011 the total share of MFI loans channelled towards the business sector was larger than for any other activity, and the total number of MFIs financing commerce is larger than the total number of MFIs financing other activities. This significant financial intervention of the MFIs might make the market problem more highly pronounced as a reason for clients loan default.

In the next section I economically explain how the aforementioned post-conflict factors affect loan repayment rate through the information asymmetry and enforcement.

4 Information asymmetry and enforcement explanations

Based on the general assessment of the findings from the field interviews in the previous section, this section explains the loan repayment challenges of the MFIs using the information asymmetry and enforcement model. The four factors focused on in the model are explained below.

1- **Misperception of a micro-loan product as a grant: -** This misconception is primarily caused by the past relief experience of the people. It basically can affect loan repayment in two ways. When a borrower misconceives the loan, it loses its willingness to repay back even if it manages to invest the borrowed money properly and gain possible leverage out of it. . On the other hand borrowers who misconceive the loan can be risky if people are more irresponsible in investing aid/grant money than loan. The later situation can add up to adverse selection problem and there by worsen loan repayment rate. This is occurred because under imperfect information that the microfinance have on intent characteristic of the borrowers (that is on whether a borrower's attitude towards the loan is wrong so that he will use it for risky investment or a borrower has the correct understanding of the loan and will use it for safe investment), the higher proportion of misconceiving clients can lead MFIs to high risk equilibrium point (with lower probability of loan repayment).

2- **High potential of population mobility/migratio**n:-In a post-war environment, the possibility of potential migration is high. This factor will be examined from the perspective that it decreases the incentive power of the dynamic incentive mechanism (i.e. providing loans for the next period only to those who repaid their loans) that the MFIs primarily use to address the moral hazard and enforcement problem.

3- **The creation of various population features in the community and the displacement of the people:-**Most people are displaced from their original homes to other places in the country; some return to their original home or move to new locations in the country; some have been soldiers in a war; some are refugees from neighbouring countries; some are inhabitants who have lived here before, during and after the war. While these characteristics may have various implications, this study focuses on the lowering of the social stigma/ sanctions between the communities.

4- **Household loss of assets due to the long civil war: -** This study discusses this feature from the perspective that it shrinks the implicit collateral penalty that groups use in order to apply pressure or enforce loan repayment among their members.

These post-conflict factors are explored here to show how they are detrimental to the likelihood of MFIs getting their money back because of their effect on the instruments typically used by MFIs to address information asymmetry (adverse selection and moral hazard) and enforcement problems.

Section 4.1 discusses how peoples' misconception of a loan lowers the repayment rate by analysing its effect on the adverse selection problem. In a post-war environment like in Burundi, there is a high likelihood for people to misperceive the micro-loan intervention as a grant, [2] creating a significant number of risky clients, leading to a high risk and low repayment rate equilibrium for the MFIs. Furthermore, group loans might not solve the MFI screening problem when the proportion of risky borrowers is so high that it no longer is proportional to the number of safe clients given the group size and under imperfect information that the societies might have about one another because of population mobility, the creation of various population features. Therefore, adverse selection because of the post-conflict factors can result in lower loan repayment rates.

Section 4.2 analyses the effect of the post-conflict factors on loan repayment rate from the moral hazard perspective, focusing on three of the post conflict factors discussed earlier. The lower social stigma created by the various population features, the loss of assets by most borrowers, making the implicit collateral needed for a group loan difficult to find, and the high population mobility that reduces the incentive of future loans to exert optimal effort make it difficult for MFIs to address the moral hazard problem in a post-conflict environment. Therefore, they realize a lower repayment rate.

The last section focuses on the enforcement perspective using the same three factors, showing that the lower social stigma, implicit collateral possibilities and population mobility created by post-conflict factors loosen the enforcement constraint, thereby lowering the loan repayment rate. In addition, this section shows how the misconception of a micro-loan as a grant can also affect repayment rate from the perspective of affecting loan enforcement.

[2] This is due to the extensive relief and aid intervention in such environment

4.1 Adverse Selection Model

Under the scenario of adverse selection where MFIs cannot distinguish the intent characteristics of borrowers that could have implications on loan repayment, the increase in the proportion of risky clients can lead to a high-risk, low-repayment rate equilibrium. Clients' misperception of loans can create a risky characteristic on the part of the borrower depending on how the misconceiving clients assumed to act.

A borrower's conception of a loan matters because people manage grants differently from loans. There are two possible ways of looking at this situation:

1- People make safer investment options with their own money /grants/ than with loaned money. So when they conceive of a micro-loan as a grant, they put it in a safe investment option.
2- People can be more irresponsible in their investment when they receive aid than with a loan because the burden of repaying the loan can make people more responsible with it rather than a grant. The irresponsible investment as a result of the misconception of a loan as a grant can, therefore, create risky behaviour leading to an adverse selection problem.

In the first possibility the very fact that people misconceive the loan as a grant can lead to a safer investment option than gambling and may not result in an adverse selection problem. These clients will be less likely to gamble than those with the correct understanding of a loan. The following model explains this case:

Consider an individual who can invest in a safe small return and zero risk projects and a risky project (gamble). The investment is \$1. In the safe investment the net return is y. In the gamble the probability of S (success) is p while the probability of F (failure) is $(1-p)$. In the case of S, the return is $Y_s > 1$. In case of failure, it is 0 (for simplicity).

The expected net return of the gamble is

$$\tilde{y} = pY_s - 1 \quad \ldots\ldots (1)$$

With limited liability the expected net return is

$$\bar{y} = p(Y_s - 1) \quad \ldots\ldots (2)$$

It is obvious that $\bar{y} > \tilde{y}$. Now, the condition for gambling with borrowed money is $\bar{y} > y$

The condition for gambling with the one's own money is $\tilde{y} > y$.

A client willing to gamble with his own money would also be willing to gamble with borrowed money (under limited liability).

A client could be willing to gamble with borrowed money even when the gamble has a negative expected net return. $(\bar{y} > y > 0 > \tilde{y}$ *f.ex when* $y = 1/10; Y_s = 3; p = 1/4)$

In line with this differential treatment of borrowed money and one's own money, the misconception of loan with grant can lead to a safer investment option than gambling and not add to the adverse selection problem. Although ex-ant misconception leads to a safe investment option, ex-post can still intensify the enforcement problem. The clients who misperceive the loan as a grant are less likely to be willing to repay the loan. The detailed explanation of the effect of client misconception of the loan on enforcement problem is presented in Section 4.3.

The second way of looking at the misconception of a loan is that when borrowers consider the loan as a grant, they will be less responsible in their investment because it reduces the feeling of responsibility for the fund's management that would have been created as a result of the burden of repayment. This perspective has adverse selection implication as irresponsible investment characteristic by clients who misconceive the loan bring risky characteristic. Hence, in an adverse selection environment with other elements being constant, the increase in the proportion of clients who misconceive the loan as a grant can result in a high risk pooling equilibrium for MFIs. The adverse selection model presented in this section illustrates this scenario.

When MFI are unable to distinguish between borrowers there is only pooling equilibrium were all heterogeneous borrowers borrow at the same rate. And in an adverse selection scenario like the one presented here, the high proportion of risky borrowers (in this case uninformed/ those who misconceive the loan as a grant) as a result of high relief intervention leads MFIs to an equilibrium with only risky borrowers, thereby increasing the probability of loan defaults.

The screening problem in the adverse selection problem is addressed by group lending. The benefit mentioned by most MFIs interviewed here is when borrowers have good information about one another. Since the society knows its members, it can easily screen safe vs risky

clients, making the group loan an easy solution for the screening problem even in the post-war scenario. Some MFIs have even changed to this strategy.

However when borrowers have little information about one another, there is little to gain from a group loan in mitigating the adverse selection problem. Moreover, when the proportion of risky borrowers is high, there is little gain from the screening benefit. This could be the reason why some MFIs responded that they face a problem in group lending as borrowers complain that they cannot find enough partners to be jointly liable.

Both scenarios will be explained using Ghatak's (1999) model of group positive assortative matching and point out the possibility of heterogeneous matching as a result of unbalanced supply to fill the required group size from his extension. In addition, this analysis will discuss Armendáriz De Aghion and Gollier's (2000) finding that under imperfect information positive assortative matching might not be the case. Based on these two papers, the reason that some MFIs benefit from group screening is that in areas where the borrower proportion is balanced enough to form the required group size in Gathak case, and when borrowers have enough information in Armendáriz and Gollier's case, then positive assortative matching is possible, and as a result, the screening problem for the MFIs is solved. However, the response by some MFIs that borrowers lack enough members to form a group is similar to Ghatak's (1999) extension of the model and Armendáriz De Aghion and Gollier's (2000) finding; that is when borrowers do not know one another or the number their type is not enough to fill the required group size, heterogeneous group are possible. In such a case, MFIs gain little from joint liability for screening borrowers, reducing the chance that a group loan improves loan repayment rate.

Therefore, a low probability of loan repayment in a post-conflict scenario can occur in an adverse selection from the perspective of high proportion of risky type borrowers, resulting in a high risk pooling equilibrium with lower loan repayment for MFIs. Although group loans address the problem in some cases, they do not when borrowers cannot find enough partner of its type to fill the required group size and when the borrowers do not know one another. Therefore MFIs gain little from group loans in a post-conflict scenario in addressing adverse selection to improve repayment rate.

The section below begins by showing how a high proportion of risky borrows that misperceives the loan leads MFIs to high risk pooling equilibrium with lower repayment.

Then the findings of Ghatak (1999) and Armendáriz De Aghion and Gollier (2000) in relation to group lending, screening problems, and repayment rates are discussed.

ASSUMPTIONS

- Borrowers populated by a continuum of household size 1 and their aim are to maximize their payoff or gain.
- Borrowers are only two types informed (those who have the correct perception about the micro-loan product) referred to here as safe borrowers and uninformed (those who confuse the loan with a grant) referred to as risky borrowers.
- The borrowers who misconceive the loan as a grant invest the borrowed funds in a high-risk project which can earn them a high return but at a very low probability and the informed that have good perception invest it in safe project which has high probability of success but with moderate or low return.
- Projects once started yield success or failure; i.e., only 2 project outcomes which are independently distributed across borrowers of the same types as well as across different types.
- The probability of success and earning high return Y_S for safe and Y_r for risky borrower is p_s and p_r, respectively. And the corresponding probability of failure and getting 0 returns for safe and risky borrowers is 1- p_s and 1-p_r, respectively. With $0< p_r < p_s <1$ and $Y_r > Y_S$. This means that by the very nature of their misconception of the loan product, the risky borrowers invest in the project which can give them high return but at a very low probability of success.
- I follow Stiglitz and Weiss (1981), and assume that projects have the same mean but differ only in terms of riskiness, i.e expected returns, $Y_s p_s = Y_r p_r = Y > 1$
- Borrowers' opportunity cost of borrowing is their reservation utility/ the status quo reservation pay off which is exiguously given and equal for all types of borrowers.
- Both borrowers and MFIs are risk neutral.
- A representative MFI which has a main objective of maximizing social surplus by extending a loan until zero profit conduction is satisfied and not making any positive profit is used here.
- The representative microfinance loan fund has an exogenously given constant opportunity cost denoted as ρ. This opportunity cost of capital can also be called the cost of fund for an MFI. $\rho > 0$.

- The MFI lends \$1.00 and receives a repayment of $r > 1$ which is the amount to be repaid inclusive of interest rate. But this repayment occurs *only if* a business project makes a profit. Otherwise, I suppose that a borrower pays nothing to the MFI; it defaults on the loan contract This also implies limited liability, that the borrower's exposure in the contract is limited to project returns and a borrower whose project fails owes nothing to the MFI.
- The investment made through borrowing is expected to return more than the cost of the capital and labor so that social surplus is maximized. $p_i Y_i > u + \rho$, where i= s, r
- λ proportion of borrowers are safe and $(1-\lambda)$ are risky types.

As in Gathak 1999, I construct the adverse selection model as a 2-stage sequential game between a representative MFI and the borrowers. First, the microfinance institution announces its interest rate and amount of joint liability, c, to the borrowers and then the borrowers accept the contract and select their partners or enjoy their reservation payoff, u. If the borrowers decide to accept the loan, projects are carried out and outcome-contingent transfers as specified in the contract are met.

The main objective of the MFI is to maximize the social surplus under the zero profit condition. And then the borrowers decide to enter or not based on the announced interest rate.

In my model, I follow Ghatak's (1999) adverse selection model but extends some of the terms in my study context to show the implications of specific post-conflict factors in intensifying the adverse selection problem to increase the loan repayment risk of the MFI.

I begin with a full information scenario, and then extended the model to an adverse selection situation involving information asymmetry concerning the type of borrowers; that is a situation in which the MFIs do not have information concerning the type of borrower (risky or safe) while the borrowers know one another other very well. In such an information asymmetry scenario, it is shown that the increased proportion of risky borrowers can lead the MFIs into high risk equilibrium.

Full information case

In the full information scenario, the MFI knows the type of borrowers so that it specifies the interest rate by setting it higher/lower for risky/safe, respectively. The borrowers then decide to enter or not depending on the announced interest rate.[3]

In the first stage the MFI maximizes the social surplus as

Max $\{p_i Y_i - \rho - u\}$

Subject to $p_i r_i - \rho = 0$

This optimization implies that the MFI chooses the lowest r_i, which satisfies the zero profit condition, and the MFI knows the type of borrowers, meaning there can be two separate interest rates, one for each kind of borrower, where separate equilibrium is possible.

So in the first stage, the MFI set

$p_i r_i^* = \rho$ where i= s, r respectively (Equation 1)

Equation 1 can similarly be specified as $r_i^* = \frac{\rho}{p_i}$, $r_s^* = \frac{\rho}{p_s}$ and $r_r^* = \frac{\rho}{p_r}$

In the full information scenario, the MFI announces separate interest rates for risky and safe borrowers, $r_s$when the borrower is safe and $r_r$when the borrower is risky. From the assumption ($0 < p_r < p_s < 1$), Equation 1 gives $r_s < r_r$. The safe borrowers are given a lower interest rate than the risky ones as they are more likely to pay.

Then based on the announced interest rate (r_i^*), the borrower decides whether to participate or not.

For borrower i to prefer borrowing

$p_i(Y_i - r_i^*) + (1 - p_i)0 \geq u$ .....(eq3) Participation constraint of borrower i.

This implies

[3] Setting the problem in a form where the MFI first announce its interest rate based on its zero profit conduction and then the borrower decided whether to participate or not is similar to setting the maximization problem where the MFI maximizing social surplus under the MFI zero profit conduction and the borrowers participation constraints. It Maximizes social surplus because the my assumption that MFIs doesn't have profit motive rather maximizing the social surplus achieving break-even.

$p_s(Y_s - r_s^*) \geq u \Leftrightarrow\Rightarrow$ Y $\geq p_s r_s^*$ + u for safe to participate

$p_r(Y_r - r_r^*) \geq u \Leftrightarrow\Rightarrow$ Y $\geq p_r r_r^*$ + u for risky to participate

If this participation constraint holds, the maximum interest rates that borrower i would be weakly convenient to demand for a loan can be found. Let that interest rate level be r*.

Therefore, $r_i^* = \frac{Y_i - u}{p_i}$

However, since the MFI in the first stage announces an interest rate that satisfies the zero profit condition, the participation constraint won't hold.[4] And all borrowers participate in the second stage.

All types of borrowers participate in the full information scenario, and the MFI charges the interest rate related to the risk types. Therefore, the adverse selection is not a challenge as the MFI has full information and can price discriminate between the safe and the risky or ask high collateral for the risky borrowers.

Asymmetric information

With asymmetric information, the MFI cannot distinguish between safe and risky borrowers, but the borrowers know their types. When the MFI cannot differentiate between the two types of clients, those who are informed (with the right conception about the micro-loan product and invest the finds in a safe investment) and uninformed (with a misunderstanding of the loan product as a grant and invest the loan in a risky investment). In an asymmetric information scenario, the MFI cannot write state-contingent contracts based on the type of the client.

Based on the assumption that the main aim of the MFI is to maximize the social surplus under the zero profit condition as in the first stage, the MFI announces its interest rate under the following optimization constraint. Since the MFI cannot distinguish between the type of borrowers, it announces the same interest rate(r) for both borrowers that fulfils the following optimization problem:

[4] Because I already assumed that social surplus is maximized $p_i Y_i > u + \rho$

Max $\lambda\{p_s Y_s\} + (1-\lambda)\{p_r Y_r\} - u - \rho$

Subject to

$\lambda\{p_s \mathrm{r} + (1-p_s)0\} + (1-\lambda)\{p_r r + (1-p_r)0\} - \rho = 0$

With rearrangement the optimization problem can also be written as:

Max $\mathrm{Y} - \rho - \mathrm{u}$

Subject to

$\{\lambda p_s + (1-\lambda)p_r\}r - \rho = 0$

This means the MFI maximizes the social surplus under the information asymmetry condition that it cannot distinguish between borrower types subject to the constraint that the expected pay-off from borrowing equals outside opportunity.

The terms in the objective function are

Y = Expected project return

ρ = Opportunity cost of capital or cost of fund for $1. for the MFI.

u = Borrower reservation utility.

The terms in the constraint are

$\{\lambda p_s + (1-\lambda)p_r\}r$ = The expected profit for the MFI from lending $1. Denoted as Eπ.

$\{\lambda p_s + (1-\lambda)p_r\}$ = Average probability of success

r= Return on lending $1. (r)

ρ = Opportunity cost of capital or cost of fund for $1. for the MFI.

Denote $\{\lambda p_s + (1-\lambda)p_r\}$ as P which has been illustrated above as the average borrower individual probability of success, referred to here as the probability of loan repayment as in Amitrajeet A. and Hamid (2010), because it is assumed that if the borrowers are successful, then they can repay; if not, they default. Since the aim here is to show how the increase in the proportion of risky type borrowers decreases the probability of loan repayment at equilibrium,

the probability of loan repayment P is written as a function of borrowers' proportion (λ); thus, $P = P(\lambda) = \{\lambda p_s + (1-\lambda)p_r\}$

Since $Y > \rho + u$ by assumption, this MFI optimization problem implies the MFI will choose the lowest possible r that will satisfy the zero profit condition.

$r^* = \frac{\rho}{P(\lambda)}$

Based on the announced r, borrower i in the second stage decides whether to borrow or not.

Similar to the full information case, borrower i decide to borrow if

$p_i(Y_i - r^*) + (1-p_i)0 \geq u$ ..... Participation constraint of borrower i.

This implies

$p_s(Y_s - r^*) \geq u \Leftrightarrow Y \geq p_s r^* + u$ for safe to participate

$p_r(Y_r - r^*) \geq u \Leftrightarrow Y \geq p_r r^* + u$ for risky to participate

Since $p_s > p_r$ by assumption, safe borrowers have a higher likelihood of getting the money implying that safe borrower participation constraint binds at r_s which is less than the critical interest rate/ return of lending that makes a risky borrower participation constraint binds i.e. r_r.

Then, for the equilibrium which fulfils both the MFI optimization and the borrowers' participation decisions, the equation below has to be satisfied:

$$r^* = \frac{\rho}{P(\lambda)} \leq \frac{Y-u}{p_r}$$

Since ρ is an exogenously given constant, r^* can take values higher or lower depending on P(λ) ,

In the extreme scenarios where λ =1, then $r^* = \frac{\rho}{p_s}$

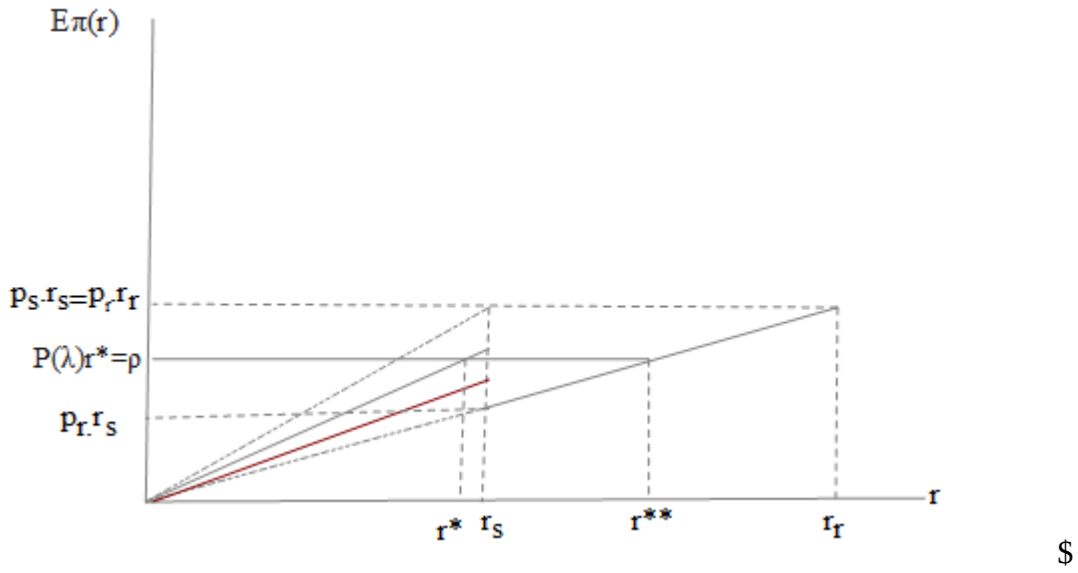
λ=0 , then $r^* = \frac{\rho}{p_r}$

The investments made through borrowing are expected to return more than the cost of capital and labour (i.e $Y > \rho + u$) by assumption. Therefore, the above equilibrium condition can

always be satisfied for all values of λ. However, the loan repayment risk for the MFI is not the same. It increases with the increase in (1-λ), and for (1-λ) above a certain threshold, at equilibrium only the risky clients will participate. The MFI is then subject to higher risk as the probability of loan repayment decreases to a lower level from P(λ) to p_r.

Graphically, this case is explained below by drawing the expected profit from lending for the MFI as a function of return on lending for $1. (r). Since there are only two types of borrowers (informed/i.e., safe) or (uninformed/i.e., risky), the graph is not hump-shaped as in Stigliz and Weisse (1981) but is similar to Bardhan and Udry (1999) with some discontinuity at $r_s = \frac{Y_s - u}{p_s}$ at a level of r where the safe stop demanding the loan.

Figure 4 A: The expected profit from lending as a function of return for $1.00 lent Eπ(r)



The expected profit from lending as a function of r (i.e., return on $1. lent) Eπ(r)=P(λ).r has a slope P(λ) up to r_S and then a slope of p_r after r_s. This means after r_S it becomes more flat as the loan becomes more risky, having a lower repayment rate p_r and only risky clients demanding the loan.

For the range of return on lending rε[0,r_s], changes in the proportion of risky clients in the economy affect the expected profit from lending and the probability of loan repayment. But for r ε(r_s, r_r] the change in the proportion of risky clients in the economy leaves the expected profit from lending and the probability of loan repayment unchanged.

For the extreme cases where the proportion of risky clients is $(1-\lambda) = 0$, the expected profit curve ($E\pi(r)=P(\lambda).r$) for $r\varepsilon[0,r_s]$ becomes steeper and has the slope P_s as depicted in the steeper dotted line in Figure 1 and the probability of loan repayment increases from $P(\lambda)$ to P_s. For the other extreme case where $(1-\lambda)= 1$, the expected profit curve $E\pi(r)=P(\lambda).r$, for $r\varepsilon[0,r_s]$ becomes flatter and has a slope p_r (slope decreases from $P(\lambda)$ to P_s). And the equilibrium r becomes above r_s, and the probability of loan repayment decreases from $P(\lambda)$ to p_r.[5]

To show the implication of the proportion of high risky borrowers in the post-war scenario, let the initial proportion of risky clients under normal circumstance be $(1-\lambda)$. This means that the proportion of safe clients is λ. For λ proportion, the initial expected profit from lending for the MFI is indicated by the bold black straight line which increases with r showing some discontinuity at r_S at the level of return on lending that makes the safe clients drop out of the market. For the exogenously given cost of fund assumed to be $\rho < P(\lambda)\, r_S$ as depicted in the graph, the equilibrium return on lending that satisfies both the borrower and MFI conditions is $r^* = \rho / P(\lambda) \leq Y-u/p_r$. At this equilibrium level the probability of loan repayment is $P(\lambda)$.

Ceteris paribus, if there is some exogenous increase in the proportion of risky clients in the economy, then the expected profit from lending $E\pi(r)$ for $r\varepsilon[0, r_s]$ becomes flatter as represented by the red line in Figure 1. For an increase in the proportion of risky borrowers making $\rho > P(\lambda)\, r_S$[6], then the new equilibrium r that satisfies the equilibrium condition increases from r* to $r^{**}=\rho/p_r \leq Y-u/p_r$. And at this equilibrium level the probability of loan repayment decreases to p_r with no safe clients participating at this pooling equilibrium.

Because of the problem of adverse selection, the MFI cannot separate equilibria for risky and safe clients. No screening mechanism such as the typical group lending means that the MFI will have only one pooling equilibrium for both risky and safe clients. Thus, as described above, in the adverse selection scenario, the increase in the proportion risky borrowers in the

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[5] The shift is because $P(\lambda) = \lambda p_s + (1-\lambda)p_r$ is the slope of $E\pi(r)=P(\lambda).r$

From this,

since I assumed that $p_s > p_r$

$dP(\lambda)/d\lambda>0$ which implies $P(\lambda)$ increases whenλ increases(when the proportion of safe borrowers increases). $dP(\lambda)/d(1-\lambda)<0$, $P(\lambda)$ decreases when the proportion of risky borrowers increase.

[6] Everything constant but exogenous increase in the proportion of risky clients means $P(\lambda)$decrease. This is for the same reason given in footnote 5

economy, lead the MFI at equilibrium to fail from having safer clients that have higher probability of success and thereby decreasing its probability loan repayment.

Therefore, the increased number of risky uninformed clients in the post-conflict environment as a result of relief intervention can cause the new equilibrium r to increase from r* to r**. This takes the safe clients out of the market and causes a new decreased loan repayment rate P_r for the MFI.

The high proportion of risky borrowers in the post conflict economy results in the MFI having a lower probability of getting its loans repaid because the resulting increase in the equilibrium return on lending is higher than the threshold return on lending that keeps the safe borrowers in the market.

One of the strategies used as a screening mechanism by the MFI is joint liability lending. This approach can address the screening problem, but in some cases (i.e when the borrowers do not find enough homogeneous partners to fill the required group size and have information barriers) its benefit is very small as explained by Ghatak1999 and Armendáriz De Aghion and Gollier (2000).

Ghatak's model of assortative matching

The borrower in a group loan who is successful in addition to meeting his own loan repayment (r) is liable for the amount (c) of his partner's loan if his partner fails. This joint liability enables the MFI to discover the information of the borrowers (if they have perfect information) as they will be positively assertively matched.

Given the announced value of (r,c) by the MFI in the first stage, borrowers will choose partners of the same type in the second stage.

The expected pay off of borrower type i when her partner is type j under joint liability lending is

$$EU_{P_iP_j}(r,C)=P_iP_j(Y_i-r)+P_i(1-P_j)(Y_i-r-C)$$

Which can be written as $EU_{P_iP_j}(r,C)=P_i(Y_i-r)-P_i(1-P_j)(C)$

To determine whether the risky and safe borrowers have matched or not requires comparing the net expected gain of risky type from having safe type and the net expected loss of safe

type from having risky type. If the net expected gain of the former is large enough to cover the net expected loss of the latter, then negative assortative matching has resulted. However, the comparison below shows that this is not possible

The net expected gain of risky borrower from having safe partner is

$$EU_{rs}(r,C)-EU_{rr}(r,C)=P_r(P_s-P_r)(C)$$

And the net expected loss of the safe borrower from having risky partner is

$$EU_{ss}(r,C)-EU_{sr}(r,C)=P_s(P_s-P_r)(C)$$

Since $P_r<P_s$ from the two equations it is clear that the net expected gain of the risky type is always smaller than the net expected loss of the safe type

$$EU_{rs}(r,C)-EU_{rr}(r,C)=P_r(P_s-P_r)(C) \;<\; EU_{ss}(r,C)-EU_{sr}(r,C)=P_s(P_s-P_r)(C)$$

Therefore the net gain that the risky borrower obtains from being matched with a safe type is not enough to cover the net cost that the safe borrower incurs from being matched with a risky type. Hence, in equilibrium group formation, negative assortative matching of groups is not possible. Although both risky and safe borrowers want safe borrowers, the latter value safe borrowers more than the risky borrower does. Thus, there is no mutually beneficial way for risky and safe types to group together; that is, a risky borrower cannot cross-subsidize a safe borrower in order to be accepted as a partner, leading to a group with similar risk behaviour (i.e positive assortative matching)

Therefore, with the positive assortative matching the MFI is able to screen borrowers and offer separate contracts for risky and safe borrowers, and thus, is able to improve their loan repayment rates under group lending.

Ghatak's homogeneous assortative matching model provides a good rationale for the Burundi MFIs that mentioned group lending as a good screening mechanism. However, when the risky type is more numerous than the safe type, which is a possible scenario in post-war areas[7], assortative matching is sometimes not possible. MFIs that mentioned little benefit from group screening could be seeing the failure of positive assortative matching in areas

[7] Remember the risky vs safe borrowers classification in this paper is based on the borrows conception of the loan. Those who misconceive the loan with grant are risky and those who have right perception about the loan are safe. See the assumption above. And in post conflict environment the risky type can be very high as compared to the normal environment as a result of the high relief intervention in such places.

were the proportion of risky borrowers is so high that safe borrower groups could not find enough partners of same type to fill the required group size. Ghatak's (1999) extension of the model offers a reason for this outcome.

As per Ghatak 1999, when the supply of partners of each type is unbalanced with respect to the required group size, the positive assortative matching won't be possible. Since safe borrows will always attract the risky borrowers; when there is not enough safe type for the safe borrowers to form the required group size, they can always attract the risky borrowers away from its partners to fill the group size. In the formation of such heterogeneous group MFIs can get little advantage out of group lending to lower its high risk and raise the low repayment rate in the post conflict environment.

In addition, the reason borrowers are not able to find enough partners might be due to imperfect information about each other, a problem resulting from population displacement. When borrowers have imperfect information, homogenous assortative matching is unlikely. Armendáriz De Aghion and Gollier (2000) show that with heterogeneous, anonymous, and relatively mobile borrowers, random (rather than assortative) matching is incentive compatible for all types of borrowers. As per their finding under imperfect information among borrowers, homogenous assortative matching no longer leads to an equilibrium situation. This means that the benefit of screening that the MFIs get from group lending can decrease, leading to little gain from group lending in post-conflict area as borrowers have imperfect information about each other.

Therefore, not much improvement in the loan repayment rate can be achieved even under joint liability lending in a post-war scenario when there is a high risky client proportion and borrowers having imperfect information about each other.

4.2 Moral Hazard Model

Similar to the adverse selection discussion, this section, start from the full information case and continue to explain how specific post-conflict factors make it difficult for MFIs to solve moral hazard problems when there are information barriers in monitoring how the borrower uses the money. The primary instruments typically used by MFIs to mitigate the effect of moral hazards associated with these barriers concerning the action of the clients are group collateral(c), group social pressure/sanction (w), group implicit collateral (F) and dynamic

incentive (δY). However in the post-conflict environment due to high client mobility, the creation of various population features and the loss of assets by a significant number of people, the weight borrowers give to the next loan period, the social stigma, and the implicit collateral possibility among group borrowers is lower.

To explore this relationship, I developed a moral hazard model, one that extends Ghatak's (1999) model showing how group lending reduces moral hazard. The model I developed here adds social pressure (W), group implicit collateral (F), and dynamic incentive (**δh**) to the group collateral found in Ghatak's model. These instruments are included as they are used by MFIs to put pressure on and to add incentives to make clients put forth a high effort in the absence of access to information for monitoring their action.

Assumption

This model includes all of the assumptions of adverse selection except in this case the representative MFI can completely distinguish between borrower type but does not have full information on how the borrowers use the money.

Under such a moral hazard scenario, the borrower does not fully internalize the cost of the project failure; therefore, he will choose less action which may lead it to a lower probability of success, meaning that the MFI will have a lower probability of getting its money back.

- Borrowers get higher output Y_h with probability p and with probability (1-p) 0. But in this case the probability of borrower success depends on borrower action. As in Ghatak(1999), it is assumed that borrowers take actions which can be considered as a level of effort Pε [0,1] costing him a disutility cost of $1/2\beta p^{2.}$. As before if borrowers are successful, they can repay the loan; if not, they will default. Therefore, higher probability of borrower success means higher probability of loan repayment for the MFI.
- For the sake of simplicity, it is assumed that u=0 borrowers have 0 reservation utility.
- Borrowers in a group can observe one another perfectly and without cost as well as enforce agreement regardless of their levels.

Full information

Under full information, the MFI can fully observe the borrower's choice of action without any cost. In this case the MFI can always make the borrower choose the maximum P* that

maximizes the social surplus by announcing the rate of return from lending the equivalent to it.

The p that maximizes the social surplus is

$P^* = \arg\max\{pY_h - 1/2\beta p^2 + (1-p)\,0\} = Y_h/\beta$, Assume $Y_h < \beta$..... (Equation 1)

Therefore based on this, the MFI that maximizes social surplus under its condition of making zero profit will charge $r=r^*=\rho/P^*$.

Based on the announced interest rate, the borrower participates by choosing an action such that its expected marginal return equals its marginal cost (which is P *). Therefore, under full information the MFI can achieve the highest possible repayment rate because it can make the borrower implement the action $P^*= Y_h/\beta$

When there are information barriers such that the MFI cannot see how the borrower uses the money, a borrower that aims to maximizes his own pay-off will deviate from P*. This is found in particular in the absence of collateral or other means of putting pressure on a borrower to implement the best action which can give a higher probability of success and thereby a higher repayment rate for the MFI.

In the post-conflict environment, solving the moral hazard problem is more difficult because of the post-conflict factor that weakens the instruments MFIs typically use to curb this problem.

When there are information barriers concerning how the borrower uses the money, the borrower that maximizes his pay-off will deviate from P* by choosing P given the interest rate based on the following optimization:

$P = \arg\max\{p(Y_h - r) - 1/2\beta p^2 + (1-p)\,0\} = (Y_h - r)/\beta$, ... (Equation 2)

This is prevails especially in the absence of collateral or other means of making pressure on borrower to implement the first best action which can give higher probability of success and thereby higher repayment rate for the MFI.

P chosen by the borrower under the moral hazard is lower than P under perfect information. In this case, if the MFI does not use any instrument for monitoring or other mechanisms that put pressure on the borrower to put forth more effort, the borrower will select

P=(Y_h -r)/ β < Y_h/ β . Therefore, the probability of borrower success and the probability of loan repayment for the MFI decrease under this moral hazard scenario.

Putting P= (Y_h -r)/ β from the borrower maximization condition to the MFI zero profit conduction to find the equilibrium P gives the following result:

$$Pr = \rho$$ ..... (Equation 3)

$$\Rightarrow \beta p^2 - Y_h\, p + \rho = 0$$ ..... (Equation 4)

This quadratic equation can give two values for P consistence with the equilibrium. This research assumes that the equilibrium with the highest value of P will be chosen.

$$P^{\circ\circ} = \frac{Y_h \pm \sqrt{Y_h^2 - 4\beta\rho}}{2\beta}$$

Taking the highest of the two P

$$P^{\circ\circ} = \frac{Y_h + \sqrt{Y_h^2 - 4\beta\rho}}{2\beta}$$ ..... (Equation 5)[8]

The typical microfinance instruments mentioned above can reduce the moral hazard problem. However, in the post-conflict scenario, these instruments are not powerful enough to solve the moral hazard problem. The section below illustrates this by extending the model to include the typical MFI instruments used for the solution of moral hazard.

Group collateral (c)--Making borrowers jointly liable for the default of their co-members. When borrowers take out a loan jointly, they can co-operate or not co-operate. As in Ghatak (1999), the outcome of the joint liability instrument on the reduction of the moral hazard (and thereby increasing loan repayment) depends on how the borrowers in a group take action. In the post conflict economy gap created in the population because of the diverse population type in a community, and mobility means it is unlikely for groups to take action cooperatively. This case will be considered in later calculations.

[8] Let us assume that Y_h^2 -4βρ> 0 , so that equilibrium P is possible.

Group implicit collateral (F)[9]**--**Encouraging borrowers to hold implicit collateral jointly. If a group member fails to repay his loan, the other members may take away their implicit collateral. Therefore, holding F will apply peer pressure and by so doing control the moral hazard problem. The application of this peer pressure to reduce the moral hazard is difficult in the post-conflict economy due to the loss of assets by most of the population, making the value of F very low. Therefore, in the post-conflict environment the potential of solving the moral hazard through implicit collateral is small.

Social sanction or the social penalty (W)--Social sanction is another instrument MFIs use to put pressure on borrowers to encourage them to improve their efforts. However in post-conflict environments the population displacement and the creation of various population features reduce social stigma. With the lower social stigma, the ability of this instrument to curb the moral hazard problem is lower, leading to a lower p and, therefore, a lower probability of loan repayment.

Dynamic incentive (δY_h) (the incentive of the future benefit of getting additional loans from the MFI):- This can be used as a carrot rather than the stick of social sanction. By allowing the possibility of future loans only for groups who have paid back their loans, the MFIs create an incentive for borrowers to put more effort. But with the increased possibility of migration and the potential mobile population, the borrower discount factor for the future is low as is the value that the mobile population gives to a future loan. Thus, the moral hazard problem will less likely get solution through the dynamic incentive mechanism.

In joint liability, here I assume that the group size is only 2, borrower i and j, and for simplicity only two periods are assumed.

With the addition of the above four instrument, borrower i will now select p by maximizing his pay-off as follows:

Max

$$p_i((Y_h - r) + \delta Y_h) + p_i(1-p_j)(F-C) - (1-p_i)p_j(w+F) + (1-p_i)(1-p_j)0 - 1/2\beta p_i^{2\cdot\cdot}(6)$$ [10]

w.r.t $\mathbf{p_i}$

[9] Group implicit collateral (F): is punishment available within a group and the penalty is between borrowers not the punishment put by MFI on the borrower.

[10] The above equation is the same as writing **Max** $\{p_ip_j(Y_h - r+\delta Y_h) + p_i(1-p_j)(Y_h - r+\delta Y_h - c+ F) - (1-p_i)p_j(w+F) + (1-p_i)(1- p_i)0 - 1/2\beta p_i^2\}$

This means that the borrower who is successful with probability $\mathbf{p_i}$, gets $\mathbf{Y_h}$ this period, $\boldsymbol{\delta Y_h}$ next period (i.e. discounted future benefit of participating in the loan program) and pays his loan(r), and if his partner is unsuccessful, then he will pay this loan as well (c) but take away the collateral that he has pledged implicitly to his partner(F) and incur the disutility cost of implementing p effort ($1/2\beta p_i^2$). On the other hand, if he is unsuccessful and his partner is successful, he will face social sanction (W) and pay the implicit transfer of F to his partner (i.e W+F in total), but if his partner is also unsuccessful, both get 0.[11]

Assume the borrowers choose p non-co-operatively; that is the borrower when taking action doesn't take into account that his actions affect his partner's choice. The borrower chooses his action by taking his partner's action as a given.

The best response of borrower i from the F.O.C is

$$P_i^{\circ} = \frac{(1+\delta)Y_h - r + F - c + (c+W)p_j)}{\beta} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (7)$$

Under the symmetric Nash equilibrium $p^{\circ} = p_i^{\circ} = p_j^{\circ} = \frac{(1+\delta)Y_h - r + F - c}{\beta - c - w}$ .....(7)

To find the equilibrium p which satisfies the MFI zero-profit condition, substitute the above equilibrium condition of the borrower into the MFI zero-profit condition.

$rp + cp(1-p) = \rho$……....(8)

This gives the following quadratic equation in p:

$p^2[\beta - w] - [(1+\delta)Y_h + F]\,p + \rho = 0$..... (9)

There are two values of p consistence with the equilibrium. This research assumes the equilibrium with the higher value of P is chosen, denoted as $P^{\circ\circ}$

$$P^{\circ\circ} = \frac{((1+\delta)Y_h + F) + \sqrt{[((1+\delta)Y_h + F)^2 - 4(\beta - W)\rho]}}{2(\beta - W)} \dots\dots\dots\dots\dots\dots\dots\dots\dots (10)$$

[11] I built this with the assumption that in addition to repaying their own share of the loan, each group member must accept to repay the obligations of their defaulting borrower; other- wise the entire group is denied access to future refinancing. If a borrower defaulted but the other borrower not then the borrower who pays the loan will not include him in the next period. Therefore when the other partner covers the loan, the defaulting borrower in addition to facing a social sanction W and group penalty F he will not receive next period loan so that he won't have δY_h next period in state $(1- p_i)p_j$.

Consistence with the assumed case that borrowers are acting non-co-operatively, the equilibrium $P^{\circ\circ}$ in Equation (10) shows that joint liability (c) does not matter. But all other instruments, borrowers' implicit collateral (F), social sanction (W), and the possibility of getting the loan and investing in a project in the next period (δY_h), contribute to curbing the moral hazard problem by enabling borrower choice P to increase under the moral hazard condition.

This can be seen by comparing the two equilibriums $P^{\circ\circ}$ found the under moral hazard when the MFI did not use any instruments (Equation 5) (i.e $P^{\circ\circ}=\frac{Y_h+\sqrt{Y_h^2-4\beta\rho}}{2\beta}$) and in $P^{\circ\circ}$ in (Equation 10) found when the MFI uses its common measure for combatting moral hazard. The numerator of Equation (10) is higher than the corresponding expression of Equation (5), while the denominator of Equation (10) is lower than that of Equation (5).

However, in the post-conflict environment the reduction in these values for the reasons mentioned above means that P will still decrease, leaving the moral hazard problem unsolved for the MFIs that operate in such an environment, resulting in lower probability of success and loan repayment.

This result can be shown from the derivation of $p^{\circ\circ}$ with respect to each of the three instruments. Assume $\beta > w$

$$\frac{dP^{\circ\circ}}{dF}=\frac{\sqrt{[((1+\delta)Y_h+F)^2-4(\beta-W)\rho]}+((1+\delta)Y_h+F)}{2(\beta-W)\sqrt{[((1+\delta)Y_h+F)^2-4(\beta-W)\rho]}}>0$$

This means that in the post-war environment, the loss of assets of most borrowers lowers F (the implicit collateral that co-members hold to apply pressure on partners to put forth the required effort). Therefore, the lower F is positively associated with a lower probability of success, eventually leading to a lower probability of loan repayment.

$$\frac{dP^{\circ\circ}}{d\delta}=\frac{\sqrt{[((1+\delta)Y_h+F)^2-4(\beta-W)\rho]}+Y_h((1+\delta)Y_h+F)}{2(\beta-W)\sqrt{[((1+\delta)Y_h+F)^2-4(\beta-W)\rho]}}>0$$

This differentiation result suggests that the relation between the future discount factor of the people δ and P is positive. In a post-war scenario the potential mobility can decrease the discount factor δ, making the people highly impatient and decreasing the weight that they give the next period. This implies that the value that the people give for a future loan (δY_h) is

lower and the probability of their success will decrease giving the MFI a lower repayment rate.

$$\frac{dP^{\circ\circ}}{dW} = \frac{2\rho(\beta - W) + ((1+\delta)Y_h + F) + \sqrt{[((1+\delta)Y_h + F)^2 - 4(\beta - W)\rho]}}{2\sqrt{[((1+\delta)Y_h + F)^2 - 4(\beta - W)\rho]}(\beta - W)^2} > 0$$

This differentiation result indicates that the equilibrium probability of success and social sanctions are positively related: the lower the social stigma/sanction, the lower the peer pressure which decreases the probability of success of the borrower, thereby reducing the probability of loan repayment.

In conclusion when MFIs do not have enough information on how the borrowers use the money, the post-war factors decrease their loan repayment rate, rendering powerless the instruments used by these institutions for encouraging loan repayment and causing borrowers to shirk their effort and divert the loan into less successful activities.

4.3 Enforcement

If it is assumed that the judicial system is perfect and benevolent, and consequently can enforce any contract without any cost, then there is no fear of the contract being breached between MFI and the borrower. However, a less than perfect contractual situation requires some kind of incentives and penalties that can enforce the opportunistic borrower who maximizes his pay-off to repay the loan even in the event his project succeeds.

The issue here is that the borrower can still default even if his project succeeds; the problem involves enforcing repayment after some amount of return is realized by the borrower. To show the implication of the post-conflict factor of loosening the enforcement constraint of borrowers and thereby increasing loan defaults, this research assumes there is no moral hazard (information barriers on monitoring the borrower) or adverse selection (information asymmetry on identifying the type of borrower).

In imperfect contract enforcement, there is always a gain for a borrower by breaching the agreement unless there is sufficient penalty or incentive to ensure the repayment of the loan. If there is no instrument that can effectively serve as an incentive or a penalty, borrowers can always gain by defaulting; that is the gain from default is (Y) and the gain from payment is

(Y-r), meaning that Y > (Y-r). To mitigate the problem of borrowers breaching contracts, MFIs use instruments such as extending loans next period to only those borrowers who did not default their loan and using group loans along with the implicit collateral that the group members hold jointly and social sanctions.

These instruments, which were explained in the ex-ant moral hazard case, can be affected by the post-conflict factors. The high population mobility can reduce the incentive of next period loans; the different population features in a community along with the displacement of the people can reduce the social sanction; the loss of assets due to a war can reduce the implicit collateral that the borrowers hold. Consequently, the enforcement constraint will loosen, leading to the likelihood of default in such environments.

The equation below elaborates the enforcement constraint on a borrower. This equation will extend the case above. This model will include all of the assumptions used in the moral hazard and adverse selection parts except that here it is also assumed that there is no information asymmetry problem concerning the intent characteristic of borrower or the way the loan is put. Again for the sake of simplicity of calculation, the outside opportunity of borrower/reservation utility is considered to be 0. And the participation constraint of the borrower (the individual rationality constraint) holds.

In group lending, the gain from the payment and default comparison for a borrower i depends on the decision of borrower j.

Case 1-- If borrower j pays

Borrower i will pay if his gain from payment outweighs his gain from default given that borrower j paid the loan. This comparison is

$$Y_i - r + \delta Y_i \geq Y_i - W - F$$

For this to be satisfied

$$Y_i \geq Y^{\circ\circ} = \frac{r - W - F}{\delta}$$

Case 2-- If borrower j does not pay

Borrower i will pay if his gain from payment outweighs his gain from default given that borrower j did not pay loan. The comparison in this case is

$Y_i - 2r + \delta Y_i + F \geq Y_i$

For this to be satisfied

$$Y_i \geq Y^{\circ\circ} = \frac{2r - F}{\delta}$$

These case indicate that the MFI will get paid if at least one of the borrowers gets $\frac{2r-F}{\delta} \leq Y_s$, where s = i or j; that is if either i or j obtains a return at least as high as $\frac{2r-F}{\delta}$, then the MFI will always be paid.

On the other hand, if one of the borrowers, e.g. borrower I, earns a return between $\frac{r-W-F}{\delta} \leq Y_i < \frac{2r-F}{\delta}$ [12], then the MFI will get paid if and only if borrower j also gets a return at least as high as $\frac{r-W-F}{\delta}$, (i.e. $\frac{r-W-F}{\delta} \leq Y_j$); otherwise both borrowers default.

Reduction in the weight that borrowers give for next period income due to mobility (i.e lower δ) means

In Case 1 $\frac{dY^{\circ\circ}}{d\delta} = -1\frac{r-W-F}{\delta^2} < 0$; in Case 2 $\frac{dY^{\circ\circ}}{d\delta} = -1\frac{2r-F}{\delta^2} < 0$

This indicates that threshold return $Y^{\circ\circ}$increases with a decrease in the weight that the people give to the next period loan, meaning the likelihood of loan repayment decreases.

Effect of change in social sanction

In Case 1 $\frac{dY^{\circ\circ}}{dW} = \frac{-1}{\delta} < 0$; in Case 2 $\frac{dY^{\circ\circ}}{dW} = 0$

The reduction in the social stigma as a result of population displacement and the creation of various of population features can also increase the threshold return in these cases, leading to a lower likelihood of loan repayment.

[12] Since r is positive this always hold $\frac{r-W-F}{\delta} < \frac{2r-F}{\delta}$ which means the need threshold return for no default constraint to satisfy, is greater in the latter case (i.e in the case when his partner default) than the needed threshold return in the first case.(i.e when the other pays)

However, if at least one of the borrowers (e.g. borrower i) earns a high return such that $Y_i \geq Y^{\circ\circ} = \frac{2r-F}{\delta}$, then the reduction in the social sanction (W) will not affect the threshold Y, so the MFI's chance of repayment rate is not affected by the social sanction. A reduction in social sanction affects loan repayment rate when both borrowers obtain moderate returns $\frac{r-W-F}{\delta} \leq Y_i < \frac{2r-F}{\delta}$ where $s = i, j$

The reduction in F can decrease the thresholds in both cases

In Case 1 $\frac{dY^{\circ\circ}}{dF} = \frac{-1}{\delta} < 0$, and in Case 2 $\frac{dY^{\circ\circ}}{dF} = \frac{-1}{\delta} < 0$

The likelihood of MFIs loan repayment decreases when the implicit collateral possibility that the group holds for enforcement decreases. In both cases the derivative of threshold return increases when F increases. For all returns that both borrowers achieved at least $\frac{r-W-F}{\delta}$ (i.e.$Y \geq Y^{\circ\circ} = \frac{r-W-F}{\delta}$), the likelihood of loan repayment decreases if F reduces.

<u>Indirect effect of lower W and F in the post-conflict scenario</u>

(W and F together will be referred to as the group social penalty mechanism).

The indirect effect can be explained similar to Besely (1995): when there is a lower group social penalty mechanism, there will be cases where MFIs could get a higher loan repayment by using individual loans rather than group loans. In addition, by continuing to give group loans to groups with low group social penalty mechanisms (i.e., lower W+F), MFIs lose loan repayments that they could have obtained if they were using individual loan mechanisms.

For simplicity of showing the effect of low W and F, it is assumed W+F= 0

Using a similar procedure as before, threshold Y is calculated where loan repayment is possible for both a group loan and an individual loan (that is threshold Y that satisfies the enforcement constraint)

Under group lending

Case 1-- If borrower j pays

Borrower i will pay if his gain from payment outweighs his gain from default given that borrower j paid the loan. This comparison is

$$Y_i - r + \delta Y_i \geq Y_i$$

For this to be satisfied

$$Y^{\circ\circ} = \frac{r}{\delta} \leq Y_i$$ [13]

Case 2--If borrower j doesn't pay

Borrower i will pay if his gain from payment outweighs his gain from default given that borrower j does not pay the loan. The comparison in this case is

$$Y_i - 2\mathrm{r} + \delta Y_i \geq Y_i$$

For this to be satisfied

$$Y^{\circ\circ} = \frac{2r}{\delta} \leq Y_i$$

From these cases, MFI will get paid if at least one of the borrowers gets $Y^{\circ\circ} = \frac{2r}{\delta} \leq Y_s$ where s= i or j. That is if either i or j get a return at least as high as$\frac{2r}{\delta}$, then the MFI will always be paid.

On the other hand, if one of the borrowers, e.g. borrower i gets a return between $\frac{r}{\delta} \leq Y_i < \frac{2r}{\delta}$[14], then the MFI will get paid if and only if borrower j gets a return at least as high as $\frac{r}{\delta}$ i.e $\frac{r}{\delta} \leq Y_j$; otherwise both borrowers default.

13 This threshold return that satisfies the enforcement constraint under group lending case 1 is similar to the threshold return required under individual lending.

14 Since r is positive $\frac{r}{\delta} < \frac{2r}{\delta}$ always hold. This means the threshold return required to satisfy the no default constraint is greater in the latter case. (i.e. in the case when his partner default than pays)

For the individual loan case

Under the individual loan condition, the threshold of return necessary for the enforcement constraint to satisfy (that is for the borrower to be willing /incentivized/ to pay), the gain from his payment has to be greater than the loss from his payment no matter what j decides. The repayment decision of i does not depend on the repayment decision of j. This means that

$$Y_i - r + \delta Y_i \geq Y_i$$

For this to be satisfied

$$Y^{\circ\circ} = \frac{r}{\delta} \leq Y_i$$

This is also true for j

$$Y^{\circ\circ} = \frac{r}{\delta} \leq Y_j$$

The payment of the borrower in various situations is expressed as the following normal form game.

Table A, B , C and D: Pay-off matrix for group lending with and without group social penalty and the pay-off representation of individual lending

For group lending

(A) Without group social penalty

j \ i	Pay (P)	Not pay (N)
Pay (P)	$(Y_j- r+\delta Y_j, Y_i-r+\delta Y_i)$	$(Y_j-2r+\delta Y_j, Y_i)$
Not pay (N)	$(Y_j, Y_i-2r+\delta Y_i)$	(Y_j, Y_i)

(B) With group social penalty mechanism [15]

j \ i	Pay (P)	Not Pay
Pay (P)	$(Y_j-r+\delta Y_j, Y_i-r+\delta Y_i)$	$(Y_j-2r+\delta Y_j$**+F**, Y_i **-W-F)**
Not Pay (N)	$(Y_j$-W-F, $Y_i-2r+\delta Y_i$+F)	(Y_j, Y_i)

For the individual loan case

Pay-off for the repayment decision of the individual under individual lending [16]

Table C

j \ i	Pay (P)	Not pay (N)
Pay (P)	$(Y_j-r+\delta Y_j, Y_i-r+\delta Y_i)$	$(Y_j-r+\delta Y_j, Y_i)$
Not pay (N)	$(Y_j, Y_i-r+\delta Y_i)$	(Y_j, Y_i)

Table D The pay-off representation of a row player

s	Pay (P)	Not pay (N)
Pay (P)	$(Y_s-r+\delta Y_s,)$	$(Y_s-r+\delta Y_s)$
Not pay (N)	(Y_s)	(Y_s)

15 I put green color & bold in the cases where social penalty makes a difference in the payoff from group loan without social penalty mechanisms

16 I used red color and italic font in the cases where individual loan makes a difference in the payoff from group loan without social penalty mechanisms

The game of borrowers under the individual lending strategy is a symmetric game (where the pay-offs do not depend on which player chooses each action). Therefore, it is represented with only one pay-off (row player pay-off) in table D for clarity. S represents i or j.

Before making the comparison, assume r > F; then the aforementioned thresholds mean

$$\frac{r-W-F}{\delta} < \frac{r}{\delta} < \frac{2r-F}{\delta} < \frac{2r}{\delta}$$

$\frac{r-W-F}{\delta}$ – – The minimum threshold return required for a borrower in a group loan to be incentivized to pay given that his partner is paying the loan.

$\frac{r}{\delta}$-- The minimum threshold returns that a borrower under an individual loan will be incentivized to pay. (And it is independent of the other borrower decisions.)

-- It can also be a minimum threshold return for a borrower under a group loan to be incentivized to pay given that the other borrower has paid the loan. (When groups do not have sufficient group social penalty mechanisms (in this research when W+F=0))

$\frac{2r-F}{\delta}$--The minimum threshold return required for a borrower under a group loan to be incentivized to pay given that the other partner is defaulting on his loan.

$\frac{2r}{\delta}$-- The minimum threshold return required for a borrower under a group loan to be incentivized to pay given that the other partner is defaulting. For the case where W+F =0

The cases below illustrate where the MFI loses repayment rates as a result of group loans in a post-conflict area where the group social penalty mechanism is low stating from the case were group lending outweighing individual lending

Case A

Group lending outweighs individual lending in terms of the likelihood of getting the money back in cases where

One borrower, for example borrower I, gets a return at least as high as $\frac{2r}{\delta}$, and the other borrower (borrower j) gets a return less than $\frac{r}{\delta}$ i.e $\frac{2r}{\delta} \leq Y_i$ and $Y_j < \frac{r}{\delta}$

In this case, in the Nash equilibrium the repayment decision of the borrowers under group lending is (N_j, P_i), but the MFI will be covered for both j's and i's loan because P (payment) of at least one borrower under a group loan means the payment of both his and his partner's loan.

In the Nash equilibrium the repayment decisions of borrowers under individual lending is (N_j, P_i), but the MFI will be covered for i's loan only.

This comparison indicates that group lending enables the MFI to receive a higher loan repayment even if the group social penalty mechanisms are low as in this case.

Case B

Case B illustrates the possibility in which individual lending would have been better for the MFIs to follow in the post-conflict environment where W and F are very low [17]

This situation results when one borrower, e.g. borrower I, gets a return at least as high as $\frac{r}{\delta}$ but lower than $\frac{2r}{\delta}$ and the other borrower gets a return less than $\frac{r}{\delta}$

i.e., $\frac{r}{\delta} \leq Y_i < \frac{2r}{\delta}$ and $Y_j < \frac{r}{\delta}$

In this case, the Nash equilibrium decision of borrowers under group lending is (N_j, N_i), and the MFI will not be paid.

The Nash equilibrium decision of borrowers under individual lending is (N_j, P_i), and the MFI will be paid at least by one of the borrowers.

Therefore, the MFI will have a higher repayment rate under individual lending. Hence, by continuing to rely on the typical group lending mechanism, the MFI, rather than getting higher loan repayments, loses its chance of getting its money back.

Therefore, a lower group social penalty mechanism can also indirectly affect the MFI when it is simply following the Grameen style of group lending methodology while group losing their social enforcement mechanism. Hence, the chance of loan repayment for the MFI will be smaller.

17 The mechanism that the MFI created for getting more repayment (i.e group loan) will create more likelihood of default

But if the group had W+F > 0 such that $\frac{r-W-F}{\delta} \leq Y_j < \frac{r}{\delta}$

Then the group loan would have done better than individual loans due to the social penalty mechanism because in this case the Nash equilibrium for borrowers under a group loan is (P_j, P_i) and the Nash equilibrium for borrowers under individual loan is (N_j, P_i)

In the group loan situation the MFI will be paid back for both i's and j's loan whereas in individual loan the MFI will be paid by only one of the borrowers; therefore, due to the group social penalty mechanism, the MFI by using group loan will realize a higher loan repayment.

Extension of the enforcement m**odel**

It could also be possible to model the enforcement problem from the perspective of misconception in the post-conflict environment. For this problem, it is assumed that borrowers have already gotten output realization Y, and their misconception affects their willingness to repay the loan. Here the misconception of a loan as a grant is considered as an enforcement problem rather than as an adverse selection problem as discussed in the information asymmetry section. Thus, under imperfect contractual enforcement when borrowers totally misconceive the loan, determining a critical threshold for borrowers to be willing to pay back the money is unlikely, meaning that the loan repayment rate of the MFIs will decline. Here misconception affects their willingness to repay, not the kind of investment possibility /projects/ borrowers choose (safe vs risky) as already discussed in the adverse selection case.

This case is based on all the assumptions and the variable interpretations previously used. It begins with the scenario where borrowers misunderstand the loan and then moves to the case where borrowers have the right perception of it.

In the current model, when borrowers misperceive the loan, it means they expect to obtain δY whether they default or not while the MFI has put a penalty of not giving loans for defaulting borrowers for the next period. Borrowers mistakenly believe the MFI is a relief/ aid organization and assume that there will be not a penalty for not paying back the loan. And if all borrowers misunderstand the loan, then there is no group penalty--either social sanctions (W) or penalizing through the implicit collateral that they jointly hold (F). Consequently, W+F is 0.

Therefore, in such a scenario because of the borrowers' misconception of the loan, the chance of the MFI of getting its money back is extremely low or very unlikely.

For any borrower i or j

The gain from payment for a borrower is Y + δY-2r

The gain from default of a borrower is Y + δY [18]

When borrowers misunderstand the loan, the gain from default always outweighs the gain from repaying the loan. Therefore, borrowers even under group loan won't pay back the loan.

But when borrowers have the correct understanding of the micro-loan product, the MFI can create incentives encouraging the borrowers to repay the money as shown previously. Borrowers with the correct right understanding about the loan means they expect to have δY (discounted return from the loan investment) next period only if they pay back the loan, and if not, they expect 0. The social penalties W and F can also be positive[19] because the society has the correct understanding and, therefore, they abide by the norms of the loan.

Therefore as illustrated in the previous section, creating critical level of return at which the borrower is willing or can be forced to repay the loan is possible.

In the group loan case

MFI will get paid if at least one of the borrowers gets $\frac{2r-F}{\delta} \leq Y_s$, s= i or j; that is if either i or j gets a return at least as high as $\frac{2r-F}{\delta}$, then the MFI will always be paid.

On the other hand, if one of the borrowers, e.g. borrower I, gets a return between $\frac{r-W-F}{\delta} \leq Y_i < \frac{2r-F}{\delta}$ [20], then the MFI will get paid if and only if borrower j gets a return at least as high as $\frac{r-W-F}{\delta}$ (i.e. $\frac{r-W-F}{\delta} \leq Y_j$); otherwise both borrower default.

18 The gain from default changed from the previous section because as explained borrowers misconceive the loan means the penalty of losing next period loan won't occur and they expect to certainly get it. Besides that the social/ group penalties will not be there.

19 W+F > 0 such that $\frac{r-W-F}{\delta} \leq Y_s < \frac{r}{\delta}$ *where s = i ,j*

20 Since r is positive this is always hold $\frac{r}{\delta} < \frac{2r}{\delta}$ which means the need threshold return for no default constraint to satisfy, is greater in the latter case (i.e in the case when his partner default) than the needed threshold return in the first case.(i.e when the other pays)

And in the individual loan case

Borrower s, where s represents i or j, can be incentivized to pay back the money through the dynamic incentive of the next period loan. And there will be some critical level ($Y^{\circ\circ}$) where a borrower will be willing to pay back the money.

$Y^{\circ\circ} = \frac{r}{\delta} \leq Y_s$, where s represents i or j.

Thus, under imperfect contractual enforcement, when borrowers misperceive the loan, the chance of creating the threshold output level above which borrowers will be willing to pay the loan is unlikely. This eventually makes decreases the probability of loan repayment for the MFIs.

5 Conclusion

The importance of microfinance institutions in the revitalization of a war-torn economy is crucial for offering financial assistance for small business to recover and enabling the mobilization of the society to economic activities. However this unique potential can be lost unless MFIs focus on delivering sustainable financial support with strict loan collection procedures that ensure a high repayment rate.

The microfinance innovative approach of downscaling finance to serve the unbanked and productive poor by controlling information asymmetry (moral hazard and adverse selection), and enforcement problems with such mechanisms as peer pressure/group monitoring, peer selection and dynamic incentives may not be enough to address some of the factors causing failure of loan repayment in the post-conflict environment. The effects of the misconceptions about loans, population mobility, population fragmentation, and the asset /wealth losses of households as a result of the long civil war are exacerbating the information asymmetry and enforcement problems and thereby causing loan defaults.

The direct interviews conducted during February and March 2013 with MFIs in post-war Burundi on factors affecting their 2011 client loan default provided support for the crucial nature of these effects. The misconception, population displacement along with the creation of population features, household poverty or asset losses, business risks and/or market losses were crucial factors reported affecting client loan repayment.

The distorted credit know-how created as a result of relief intervention can limit the possibility of incentive compatible loan contracts for the MFIs and the clients. The increase in the number of clients who misunderstand a loan as a result of these long-term relief practices have implications on the MFI loan repayment rate from the adverse selection and enforcement perspective. If client misperception of loan as a grant leads to irresponsible fund management, then under the adverse selection scenario, a high risky equilibrium point is likely to result, giving MFIs a lower probability of getting their money back. Although group loans solve the screening problem, they are not the answer under all circumstances. When the supply of each type (risky vs. safe) is unbalanced within the required group size and when there is imperfect information among borrowers, groups less likely to be positively associatively matched, decreasing the effectiveness of the screening. On the other hand, lack of proper credit understanding decreases the willingness to pay, reducing the repayment rate by making

enforcement difficult. The moral hazard and enforcement problems are also difficult to solve with population mobility, household wealth/asset losses, and population fragmentation.

Loan reputation via offering a loan on a repeated basis is a viable incentive strategy for encouraging borrowers to repay the loan. This is particularly effective in addressing the enforcement problem and the information barriers affecting the monitoring of the actions of borrowers after receiving the loan. However, when clients are potentially mobile, it is difficult to create such an incentive. With a high mobility potential, clients become impatience and give lower weight to the next period loan, weakening the monitoring and enforcement benefit of the dynamic incentive scheme. This outcome is especially possible when clients move and don't know exactly if or when they will return back to their dwelling place.

The population displacement along with the creation of various population features is also another factor that worsens the moral hazard problem and loosens the enforcement constraints. This is because of the lower social stigma due to differences in the socio-economic background of people, the way communities cooperate, lack of personal knowledge about each other and trust among potential clients that is resulted. Hence with this lower social stigma, it is difficult to utilize group peer monitoring and peer enforcement.

Similarly, asset losses of most of the population in the community have analogous implication on lowering the possibility of controlling the moral hazard and enforcement problems. With smaller household assets, the clients have very little chance of utilizing implicit collateral for peer monitoring and enforcement.

The difficulty of solving the moral hazard, adverse selection and enforcement problems as a result of these post-war factors requires MFIs first, to understand them and then, to apply this knowledge in the design of a strategy that ensures client loan repayment and, thereby sustainable intervention.

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Appendix

Appendix A

Interview guide /questions used

1 – General question about MFIs and their loan product characteristic

- Number of years since its establishments/ commencing operation
- Type of the MFI (Please specify whether the MFI is savings and credit cooperatives (SACCOs), public limited company, or multi-sector projects or any other form)
- List of financial products offered by the MFI (E.g Saving, credit, etc…) if other financial products please list it too.
- Operational area (rural vs urban)
- Number of product types, and loan product characteristic[21]

2 –portfolio quality and outreach for the year 2011

- Loan repayment rate, Portfolio at risk (PAR)
- Outreach indicators :- amount of loan outstanding, loan granted, average loan size

3- Factors for clients default in 2011

- Reasons for the client default in 2011 and how those reasons contribute to loan default.
- Post-conflict factors that are detrimental for loan repayment.

4- On client profile and service

- The different population sections[22] reached by the MFI,
- General experience of financing the different population features (challenge and success)

[21] loan maximum and minimum threshold, interest rate, collateral, loan period, and repayment frequency, loan processing time

[22] Refuges, internally displaced, demobilized soldiers, returnees, and inhabitants.